

Amendments to the Claims:

This listing of the claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. (Currently amended) A magnetic detecting element comprising:

a multilayer film comprising a laminate of a free magnetic layer, a nonmagnetic material layer, a pinned magnetic layer and an antiferromagnetic layer; wherein a current flows perpendicularly to a film plane of each of the layers of the multilayer film, and the free magnetic layer comprises a plurality of soft magnetic layers which are laminated with a current limiting layer disposed therebetween, the current limiting layer comprising an insulating portion and a conductive portion;

wherein the insulating portion of the current limiting layer comprises an insulating material film having a plurality of holes extending from a top to a bottom of the current limiting layer, the holes being filled with a conductive material film serving as the conductive portion;-and

wherein the holes have an opening ratio in the current limiting layer of from about 10% to 30%, and

wherein the conductive portion of the current limiting layer comprises conductive particles, and a thickness of the current limiting layer is smaller than a particle size of the conductive particles.

2. (Currently amended) A magnetic detecting element comprising:

a multilayer film comprising an upper nonmagnetic material layer, an upper pinned magnetic layer and an upper antiferromagnetic layer, which are laminated above a free magnetic layer, and a lower nonmagnetic material layer, a lower pinned magnetic layer and a lower antiferromagnetic layer, which are laminated below the free magnetic layer;

wherein a current flows perpendicularly to a film plane of each of the layers of the multilayer film, and the free magnetic layer comprises a plurality of soft magnetic layers

which are laminated with a current limiting layer disposed therebetween, the current limiting layer comprising an insulating portion and a conductive portion;

wherein the insulating portion of the current limiting layer comprises an insulating material film having a plurality of holes extending from a top to a bottom of the current limiting layer, the holes being filled with a conductive material film serving as the conductive portion;-and

wherein the holes have an opening ratio in the current limiting layer of from about 10% to 30%, and

wherein the conductive portion of the current limiting layer comprises conductive particles, and a thickness of the current limiting layer is smaller than a particle size of the conductive particles.

3. (Previously presented) A magnetic detecting element according to claim 1 or 2, further comprising hard bias layers formed on both sides of the free magnetic layer in a track width direction, for aligning magnetization of the free magnetic layer.

4. (Previously presented) A magnetic detecting element according to claim 1 , further comprising an in-stack bias layer laminated at least one of above and below the free magnetic layer, for aligning magnetization of the free magnetic layer.

5. (Previously presented) A magnetic detecting element according to claim 1, wherein magnetizations of the plurality of soft magnetic layers are parallel to each other.

6. (Previously presented) A magnetic detecting element according to claim 5, wherein the plurality of soft magnetic layers are ferromagnetically coupled with each other through the current limiting layer.

7. (Previously presented) A magnetic detecting element according to claim 1, wherein magnetizations of the plurality of the soft magnetic layers are antiparallel to each other.

8. (Previously presented) A magnetic detecting element according to claim 1, wherein the plurality of the soft magnetic layers constituting the free magnetic layer have a same magnetic moment per unit area.

9. (Previously presented) A magnetic detecting element according to claim 1, wherein the plurality of the soft magnetic layers constituting the free magnetic layer have different magnetic moments per unit area.

10. (Previously presented) A magnetic detecting element according to claim 1, wherein the plurality of the soft magnetic layers constituting the free magnetic layer have a same thickness.

11. (Previously presented) A magnetic detecting element according to claim 1, wherein the plurality of the soft magnetic layers constituting the free magnetic layer have different thicknesses.

12. (Original) A magnetic detecting element according to claim 7, wherein the free magnetic layer comprises a nonmagnetic intermediate layer composed of at least one nonmagnetic material of Ru, Rh, Ir, Os, Re, Cr, and Cu.

13-41. (Cancelled)

42. (Previously presented) A magnetic detecting element according to claim 2, further comprising an in-stack bias layer laminated at least one of above and below the free magnetic layer, for aligning magnetization of the free magnetic layer.

43. (Cancelled)

44. (Previously presented) A magnetic detecting element according to claim 1 or 2, wherein the conductive portion of the current limiting layer comprises crystal grains and the insulating portion comprises an amorphous material.

45. (Previously presented) A magnetic detecting element according to claim 44, wherein the crystal grains comprise at least one element selected from the group consisting of Fe, Ru, Pt, Au, Rh, Ir, Pd, Os, Re, Cu, and Ag, and the amorphous material comprises an O or N compound with at least one element selected from Al, Co, Ti, Zr, Hf, Nb, Ta, Mo, W, and the rare earth elements.

46. (Currently amended) A magnetic detecting element comprising:
a multilayer film comprising a laminate of a free magnetic layer, a nonmagnetic material layer, a pinned magnetic layer and an antiferromagnetic layer; wherein a current flows perpendicularly to a film plane of each of the layers of the multilayer film, and the free magnetic layer comprises a plurality of soft magnetic layers which are laminated with a current limiting layer disposed therebetween, the current limiting layer comprising an insulating portion and a conductive portion;
wherein the insulating portion of the current limiting layer comprises an insulating material film having a plurality of holes extending from a top to a bottom of the current limiting layer, the holes being filled with a conductive material film serving as the conductive portion;
wherein the holes have an opening ratio in the current limiting layer of from about 10% to 30%, and

~~A magnetic detecting element according to claim 1 or 2, wherein the free magnetic layer comprises at least three soft magnetic layers which are laminated with the current limiting layer disposed therebetween.~~

47. (Previously presented) A magnetic detecting element comprising:
a multilayer film comprising a laminate of a free magnetic layer, a nonmagnetic material layer, a pinned magnetic layer and an antiferromagnetic layer; wherein a current flows perpendicularly to a film plane of each of the layers of the multilayer film, and the free magnetic layer comprises at least three soft magnetic layers which are laminated with a current limiting layer disposed therebetween, the current limiting layer comprising an insulating portion and a conductive portion;

wherein the insulating portion of the current limiting layer comprises an insulating material film having a plurality of holes extending from a top to a bottom of the current limiting layer, the holes being filled with a conductive material film serving as the conductive portion.

48. (Previously presented) A magnetic detecting element comprising:

a multilayer film comprising an upper nonmagnetic material layer, an upper pinned magnetic layer and an upper antiferromagnetic layer, which are laminated above a free magnetic layer, and a lower nonmagnetic material layer, a lower pinned magnetic layer and a lower antiferromagnetic layer, which are laminated below the free magnetic layer;

wherein a current flows perpendicularly to a film plane of each of the layers of the multilayer film, and the free magnetic layer comprises at least three soft magnetic layers which are laminated with a current limiting layer provided therebetween, the current limiting layer comprising an insulating portion and a conductive portion;

wherein the insulating portion of the current limiting layer comprises an insulating material film having a plurality of holes extending from a top to a bottom of the current limiting layer, the holes being filled with a conductive material film serving as the conductive portion.

49. (New) A magnetic detecting element comprising:

a multilayer film comprising an upper nonmagnetic material layer, an upper pinned magnetic layer and an upper antiferromagnetic layer, which are laminated above a free magnetic layer, and a lower nonmagnetic material layer, a lower pinned magnetic layer and a lower antiferromagnetic layer, which are laminated below the free magnetic layer;

wherein a current flows perpendicularly to a film plane of each of the layers of the multilayer film, and the free magnetic layer comprises a plurality of soft magnetic layers which are laminated with a current limiting layer disposed therebetween, the current limiting layer comprising an insulating portion and a conductive portion;

wherein the insulating portion of the current limiting layer comprises an insulating material film having a plurality of holes extending from a top to a bottom of the current

limiting layer, the holes being filled with a conductive material film serving as the conductive portion;

wherein the holes have an opening ratio in the current limiting layer of from about 10% to 30%, and

wherein the free magnetic layer comprises at least three soft magnetic layers which are laminated with the current limiting layer disposed therebetween.